CLAIMS

What is claimed is:

1. A signal bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method for remotely monitoring activity, the method comprising the following operations:

generating first server heartbeat information at a first server at a local site;

storing the first server heartbeat information on a first primary site disk at the local site;

sending the first server heartbeat information from the first primary site disk, to a first secondary site disk at a remote site;

receiving information from a second secondary site disk at the local site; and

determining if the information received from the second secondary site disk includes updated heartbeat information.

2. The signal bearing medium of claim 1, wherein the method further comprises the following operations:

generating second server heartbeat information at a second server at the remote site;

storing the second server heartbeat information on a second primary site disk at the remote site;

sending the second server heartbeat information from the second primary site disk, to a second secondary site disk at the local site;

receiving information from the first secondary site disk at the remote site; and

determining if the information received from the first secondary site disk includes updated heartbeat information.

3. The signal bearing medium of claim 1, wherein if it is determined that updated heartbeat information is not included in the information received from the second secondary site disk, then the method further comprises the operation of determining if the

PPRC state of the first primary site disk is a suspended PPRC state, and if it is determined that the PPRC state of the first primary site disk is not the suspended PPRC state, then the method further comprises the operation of concluding that the second server at the remote site is not operational.

4. The signal bearing medium of claim 2, wherein if it is determined that updated heartbeat information is not included in the information received from the first secondary site disk, then the method further comprises the operation of determining if the PPRC state of the second primary site disk is a suspended PPRC state, and if it is determined that the PPRC state of the second primary site disk is not the suspended PPRC state, then the method further comprises the operation of concluding that the first server at the local site is not operational.

5. The signal bearing medium of claim 1, wherein the method further comprises the operation of establishing a PPRC pair using a Read From Secondary option, wherein the PPRC pair comprises the first primary site disk and the first secondary site disk.

6. The signal bearing medium of claim 2, wherein the method further comprises the operation of establishing first and second PPRC pairs using a Read From Secondary option, wherein the first PPRC pair comprises the first primary site disk and the first secondary site disk, and the second PPRC pair comprises the second primary site disk and the second secondary site disk.

7. The signal bearing medium of claim 1, wherein PPRC is used to perform the sending operation.

8. The signal bearing medium of claim 1, wherein the sending operation comprises:

receiving the first server heartbeat information from the first primary site disk; and attempting to transmit the first server heartbeat information over a communications link to the remote site.

9. The signal bearing medium of claim 1, wherein the first server heartbeat information comprises a timestamp.

10. The signal bearing medium of claim 1, wherein the method further comprises the following operations:

generating third server heartbeat information at a third server at the local site;

storing the third server heartbeat information in the first primary site disk at the local site; and

sending the third server heartbeat information from the first primary site disk, to the first secondary site disk at the remote site.

11. The signal bearing medium of claim 1, wherein the method further comprises the following operations:

detecting whether a confirmation signal is received at the local site from the remote site; and if not:

determining if communications between the first server at the local site and a second server at the remote site are operational on any non-PPRC communications link; and if so:

implementing a fault mode.

12. The signal bearing medium of claim 11, wherein the operation of implementing a fault mode comprises implementing a failstop fault mode by taking PPRC resources offline and shutting down MSCS at the local and remote sites.

13. The signal bearing medium of claim 11, wherein the operation of implementing a fault mode comprises implementing a failover fault mode by keeping a quorum owning

server online, shutting down a server that is a peer of the quorum owning server, and placing all resources under control of the quorum owning server.

14. The signal bearing medium of claim 11, wherein the operation of implementing a fault mode comprises implementing a No_New_ Onlines fault mode by keeping a quorum owning server online and having resources stay online, shutting down cluster service at a server that is a peer of the quorum owning server, and taking offline all of the resources of the peer server that is shut down.

15. The signal bearing medium of claim 11, wherein the operation of implementing a fault mode comprises implementing an Online_No_Moves fault mode by keeping the first server and the second server online, and not taking any resources offline.

16. The signal bearing medium of claim 2, wherein:

the operations of receiving information from the first secondary site disk and determining if the information received from the first secondary site disk includes updated heartbeat information, are periodically repeated at a first frequency; and

the operations of generating first server heartbeat information, storing the first server heartbeat information, and sending the first server heartbeat information, are periodically repeated at a second frequency that is at least as large as the first frequency.

17. A signal bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method for remotely monitoring activity, the method comprising the following operations:

generating second server heartbeat information at a second server at a remote site;

storing the second server heartbeat information on a second primary site disk at the remote site;

sending the second server heartbeat information from the second primary site disk, to a second secondary site disk at a local site;

receiving information from a first secondary site disk at the remote site;

determining if the information received from the first secondary site disk includes updated heartbeat information, and if not:

determining if the PPRC state of the second primary site disk is a suspended PPRC state, and if not:

concluding that a first server at the local site is not operational;

and wherein the operations further comprise:

detecting whether a confirmation signal is received at the remote site from the local site, and if not:

determining if communications between the first server at the local site and the second server at the remote site are operational on any non-PPRC communications link, and if so:

implementing a fault mode.

18. A computing system, comprising:

a first storage system located at a local site, wherein the first storage system has a first primary site disk and a second secondary site disk;

a first server located at the local site and coupled to the first storage system, wherein the first server is programmed to perform operations in conjunction with the first storage system, for remotely monitoring activity, the operations comprising:

generating first server heartbeat information;

storing the first server heartbeat information on the first primary site disk;

sending the first server heartbeat information from the first primary site disk at the local site to a first secondary site disk at a remote site;

receiving information from a second secondary site disk at the local site; and

determining if the information received from the second secondary site disk includes updated heartbeat information.

19. The computing system of claim 18, further comprising:

a second storage system located at the remote site and coupled to the first storage system, wherein the second storage system includes a second primary site disk and the first secondary site disk;

a second server located at the remote site and coupled to the second storage system, wherein the second server is programmed to perform operations in conjunction with the second storage system, for remotely monitoring activity, the operations comprising:

generating second server heartbeat information;

storing the second server heartbeat information in the second primary site disk;

sending the second server heartbeat information from the second primary site disk at the remote site to the second secondary site disk at the local site;

receiving information from the first secondary site disk at the remote site; and

determining if the information received from the first secondary site disk includes updated heartbeat information.

20. The computing system of claim 19, wherein:

the operations of receiving information from the first secondary site disk and determining if the information received from the first secondary site disk includes updated heartbeat information, are periodically repeated at a first frequency; and

the operations of generating first server heartbeat information, storing the first server heartbeat information, and sending the first server heartbeat information, are periodically repeated at a second frequency that is at least as large as the first frequency.

21. A computing system, comprising:

means for generating first server heartbeat information at a first server at a local site;

means for storing the first server heartbeat information on a first primary site disk at the local site;

means for transferring the first server heartbeat information from the first primary site disk, to a first secondary site disk at a remote site;

means for receiving information from the first secondary site disk;

means for determining if updated heartbeat information has been stored on the first secondary site disk;

means for generating second server heartbeat information at a second server at the remote site;

means for storing the second server heartbeat information on a second primary site disk at the remote site;

means for transferring the second server heartbeat information from the second primary site disk, to a second secondary site disk at the local site;

means for receiving information from the second secondary site disk; and

means for determining if updated heartbeat information has been stored on the second secondary site disk.

22. A method for remotely monitoring activity, the method comprising the following operations:

generating first server heartbeat information at a first server at a local site;

storing the first server heartbeat information on a first primary site disk at the local site;

sending the first server heartbeat information from the first primary site disk, to a first secondary site disk at a remote site;

receiving information from a second secondary site disk at the local site; and

determining if the information received from the second secondary site disk includes updated heartbeat information.

23. The method of claim 22, further comprising the following operations:

generating second server heartbeat information at a second server at the remote site;

storing the second server heartbeat information on a second primary site disk at the remote site;

sending the second server heartbeat information from the second primary site disk, to a second secondary site disk at the local site;

receiving information from the first secondary site disk at the remote site; and

determining if the information received from the first secondary site disk includes updated heartbeat information.

24. The method of claim 23, wherein if it is determined that updated heartbeat information is not included in the information received from the second secondary site disk, then the method further comprises the operations of determining if the PPRC state of the first primary site disk is a suspended PPRC state, and if it is determined that the PPRC state of the first primary site disk is not the suspended PPRC state, then the method further comprises the operation of concluding that the second server at the remote site is not operational.

25. The method of claim 24, wherein PPRC is used to perform the sending operations.